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Exploring the Relationship between Maternal Meal Location and Infant Weight Gain

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## Introduction

For the first time in history, today's generation of children has a shorter life expectancy than their parents due to issues related to obesity (Koplan, Liverman, & Kraak, 2005). Obesity among family members in Ohio continues to increase, costing taxpayers over \$3.3 billion dollars in obesity-related health care expenditures. In Ohio, 17.6% of adults, 18-34 years of age, are obese and 29.2% are overweight (Center for Disease Control, 2003). Nationwide, 22.1% (median) of adults are obese and 37% (median) were overweight in 2002 (Center for Disease Control, 2007). In 1999-2002, the percent of adults at a healthy weight in the United States was 33%, about half of the goal of Healthy People 2010 of 60% at a healthy weight (United States Department of Health & Human Services [USDHHS], 2000). Even more disconcerting is the fact that today's generation of children is the most overweight of any generation in history. The Center for Disease Control (CDC) reports that, as of 2003-2004 18.8% of children 6-11 years of age in the United States are overweight, an increase of 2.5% from 2001 (Center for Disease Control, 2006). Furthermore, Columbus, Ohio is rated as one of the Top 20 Fattest Cities in America (Franklin County Board of Health, 2006).

Despite interventions to treat and prevent overweight typically focused on a healthy diet and exercise, the prevalence of overweight continues to rise. Therefore, other factors that contribute to must be addressed, such as the family involvement in establishing dietary habits of even its youngest members; its infants and children. One overlooked factor maybe the influence of an infant's family on the child's dietary habits. If this factor is found to be a strong influence on childhood weight gain, prevention programs can be tailored to address these characteristics. Because the mother is typically the primary caregiver for an infant, her dietary habits may exhibit the strongest influence on her infant's dietary habits. One characteristic that may

influence dietary habits is family mealtime. Therefore, the purpose of this study was to assess a possible the relationship between a mother's mealtime habits, the location of her meals, mother's body size, and infant weight gain during the first six months of life.

### Obesity, Overweight and Infant Weight Gain

Obesity is defined as an abnormal increase in the proportion of fat cells to other cells in the body. This mainly occurs around the organs and in the subcutaneous tissue. Obesity is categorized as a body mass index (BMI) greater than  $30 \text{ kg/m}^2$  in adults. The term overweight is used instead of obesity in children and is classified as a BMI greater than the 95<sup>th</sup> percentile for age and sex from children 2-12 years of age (Center for Disease Control [CDC], n.d.). This usually comes to a 20% increase over an ideal body weight for the specific individual. BMI is widely accepted for an initial assessment of obesity, but further evaluation should be performed when concerned with obesity because this measurement does not directly measure body fat (CDC). Overweight is classified as a BMI greater than  $25 \text{ kg/m}^2$  in adults and a BMI greater than the 85<sup>th</sup> percentile for age and sex for children 2-12 years of age signifies "at risk" for overweight. Classification of obesity or overweight is not available for children younger than age 2. Weight over the 95<sup>th</sup> percentile for age and sex or an increase in weight crossing percentile ranges may signify a tendency for overweight in children in this population (CDC).

Normal infant weight gain is typically monitored on an infant growth chart, which plots the infant's length and weight. The infant should maintain a particular growth curve; for example, an infant's growth that crosses two quartiles is a cause for concern. The infant should regain his or her birth-weight by two to three weeks past birth. Additionally, the infant should gain on average one pound per month for the first four months of life (UAB Health System, 2008).

### Contributing Factors and Outcomes

Several factors can predispose a child to overweight. One study reports that there has been an increase in the overall consumption of energy in the form of calories, from 1977 to 1996. If this excess energy is not used, it is stored as fat leading to overweight (Nielsen, Siega-Riz & Popkin, 2002). A review of studies found that increased physical activity and limiting television viewing can reduce the risk of childhood obesity (Sherry, 2005). Genetics can also have a significant impact on a child's risk for becoming overweight. More specifically, BMI is considered a commonly inheritable trait (O'Rahilly & Farooqi, 2006). Poverty also can increase a child's risk for becoming overweight. Dietz postulates that overweight in low-income families may be due to the body's adaptive response to intermittent food deficiency (Dietz, 1994). Race can also have an impact on a child's risk for becoming overweight. It has been reported that African Americans are more likely to become overweight than Caucasian Americans (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000). Overweight can lead to hypertension, type 2 diabetes, osteoarthritis, fatty liver disease, gallbladder disease, cancer and sleep apnea syndrome in both children and adults (Ievers-Landis & Redline, 2006; Mayo Clinic Staff, 2005).

### Childhood Overweight

It is particularly concerning when children become overweight because of the trend that childhood overweight leads to obesity in adulthood. The Bogalusa Heart Study examined whether childhood levels of BMI are associated with adult adiposity. Of the 2,610 children ages 2.5 –17 with a mean age of 10, BMI was predictive of adult obesity and overweight, when assessed 18 years later (Freedman, 2005). This pattern could be found even in the youngest children assessed in the study. Fifteen percent of girls ages 2 to 5 years old that had a childhood

BMI over the 50<sup>th</sup> percentile became overweight. This study showed that a high BMI is a more positive predictor of adult obesity with increasing age of the child (Freedman).

Due to the fact that BMI is not a useful measurement in children under 2 years of age, researchers must develop an accurate way to predict overweight in this population. Stettler, Zemel, Kumanyika and Stallings (2002) carried out a study to examine the correlation of rapid weight gain in infants and childhood overweight status later in life. This cohort study measured the weights of 19,397 participants at birth, four months and twelve months from twelve various cities in the United States. The study reports that there was a relationship between a rapid weight gain in the first four months of life and risk for obesity in childhood. Specifically, there is an estimated 30% increased risk of childhood obesity by age seven for 100 grams of weight gained each month for the first four months. In summary, this study found correlations between childhood overweight and higher percentile birth weight, lower maternal education and higher maternal BMI (Stettler, Zemel, Kumanyika, & Stallings, 2006). By monitoring an infant's weight gain trends, health care professionals can utilize early interventions that may possibly prevent obesity or overweight later in life.

It is essential in the prevention of childhood overweight that mothers recognize when their child is becoming overweight. Studies suggest, however, that often mothers do not recognize that their children are overweight. In a study of 622 mothers of children between the ages of 23 and 60 months recruited from nine Kentucky Women, Infants and Children (WIC) clinics and a pediatric practice within the Cincinnati Pediatric Research Group (CPRG), researchers assessed the mothers' perception of their own weight, the mother's worry about their child's weight, and other information such as maternal smoking and education level. BMI was calculated based on mother's self report of their height and weight and the height and weight of

the children that was obtained by the clinic staff (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000). The study reports that the mothers were more likely to be overweight if they had a low education level (a high school degree) and if they were receiving WIC. Obesity was more common in nonwhite mothers compared to white mothers, but this pattern was not seen between white and nonwhite children (Baughcum, Chamberlin, Deeks, Powers, & Whitaker). Of the 622 children assessed, 99 were overweight. However, only 21% of mothers felt that their child was overweight. Even among the 66 mothers of children that had a BMI over the 95<sup>th</sup> percentile, only 29% felt that their child was overweight. Low education level was the only factor that correlated with the mother's inaccurate perceptions of their child's weight. Among mothers who perceived their child as overweight, only two thirds stated that they were concerned, currently or in the future, about their child's weight. Mothers who were obese perceived themselves as being overweight, however about one third of mothers who were of normal weight saw themselves as overweight (Baughcum, Chamberlin, Deeks, Powers, & Whitaker). The population in our study mainly consists of low-education mothers receiving WIC, which in the study above found that mothers were more likely to be obese in these conditions. This forms the need to more actively educate this population on the awareness of, risks and prevention of obesity in themselves as well as their children. However, this study assessed the mothers of children ages 23 to 60, where we examined mothers of younger infants.

#### Mother's Impact on Infant Eating Pattern

Mothers can influence their children's eating habits in several ways. This includes good role modeling in healthy parent-child relationships, family organization, encouragement and positive reinforcement by the parents, and parental discipline of food consumption (Tibbs, et al, 2001; Oliveria, et al, 1992). Several studies have found that the nutrient intake of the child is

more likely to mirror that of the mother than the father, whether it is healthy or not (Oliveria, et al, 1992; Saarilehto, Keskinen, Lapinleimu, Helenius, Simell 2000; Brown & Ogden, 2004).

Parental attitudes also can affect their child's diet indirectly through the kinds of foods they buy and serve in the home (Brown & Ogden). One study in particular suggests encouraging healthy choices without restricting intake is essential for a long term healthy diet (Tibbs, et al). The Framingham Children's Study sought to determine whether nutritional risk factors for coronary heart disease (CHD) aggregates within families. One hundred and six white, middle class triads of mothers, fathers and children between the ages of 3 years and 5 years were recruited for the study. The results of this study stated that nutritional intake of the child correlated higher with that of the mother rather than the father. Children were 5.5 times more likely to consume a high amount of saturated fats if both parents ate high amounts of saturated fats compared to children whose parents both had diets with low amounts of saturated fats (Oliveria, et al). Additionally, the correlation between the nutrient intake of the parents and the child was higher in the families where the parents ate more meals at home (Oliveria, et al.). This provides support for the thought that children's diets are likely to mirror that of the parents resulting in the need to educate parents of young children in their influence on their children's eating patterns. Parents should be encouraged to form healthy eating patterns of their own to model for their children. The subjects in this study are again older than the subjects we assessed, but these results may be supported with a younger age population.

Similar findings from the study above were found in a sample of 456 African American parents who completed a questionnaire about their eating patterns, modeling behavior, and provided information on the frequency, preparation and types of foods eaten (Tibbs, et al, 2001). This study indicated that parents generally did not follow the dietary guidelines provided by the

researchers. Specifically, 93% of the parents reported 30% of energy intake was from fat (Tibbs, et al.). However, the study cited that age and level of education had a positive correlation with fruit and vegetable intake but a negative association with fat consumption. Additionally, income had a negative relationship with fat intake (Tibbs, et al.). In addition to dietary intake, family mealtime influences the child's dietary intake. Most (69.2%) of the parents in the study reported they almost always or always sat and ate meals with their child. This personal attention with the child allows the child to observe the parent and their eating habits and preferences (Tibbs, et al, 2001). Also, 59.3% of parents reported that if the parent demonstrated to the child enjoyment eating fruits or vegetables, the child in response would try the food (Tibbs, et al.). This result directly demonstrates how children are likely to follow the example set by their parents during meal times. However, during snacks, a 24.5% of parents said that their child never learned to eat low-fat snacks from them, and 30.6% of parents reported that their child sometimes learned to eat low-fat snacks from them. This study provides additional support that dietary habits are passed from parents to children through role modeling. This study further suggested educating parents of young children on healthy dietary habits and how they are learned by their children through imitation and role modeling. This study focused on African American parents, however, in our study we included all racial and ethnic groups.

From these studies, one can conclude that in general mothers have a significant impact on their children even during a young age. Behaviors are modeled through eating habits, and a child learns attitudes toward certain foods from his or her parents. Additionally, as described, one study reports that a mother's psychopathic tendencies can cause her to exhibit control over her infant's feeding at a crucial time of one year of age.



### Location of Meals

There is limited research that has focused on the relationship between where adults eat their food and weight status in adults or children. Few studies have focused on the consumption of fast food eaten outside the home and its relationship to weight gain. A nationwide study of 16,810 participants in two age groups: 12-18 years old and 19-29 years old, showed an overall increase in energy intake in both age groups. There was a decrease in the amount of energy intake consumed at home, especially so in the 19-29 age group (Nielsen, Siega-Riz & Popkin, 2002). Consuming meals outside the home resulted in increased energy consumption that is attributable to restaurants and fast food establishments, that serve food that is more energy dense and generally unhealthy. Meals prepared in the home tend to be healthier and less energy dense. The older age group in the study, 19-29, is the age group of most of the mothers to be examined in our study. As these findings suggest, nurses need to focus on increasing public awareness of the relationship between unhealthy foods (i.e. fast food) consumed outside the home and its relationship to weight status (Nielsen, Siega-Riz & Popkin). Interestingly, a study of 106 children and their mothers and fathers reports that children's diets are more likely to correlate with that of the parents when the parents eat more meals at home (Oliveria, et al, 1992).

The general home environment may be an important factor in childhood weight status as well. A study examined the relationship between television viewing time, fast food consumption and BMI in adults (Jeffery & French, 1998). The researchers recruited 332 low-income women, 529 high-income women and 198 men. Information on demographics, smoking status, energy intake and percent from fat, minutes of physical activity a day, fast food consumption, hours of television viewing, height and weight was collected from these individuals. All of the data were self-reported except for height and weight (Jeffery & French, 1998). An increase in fast food

meals per week was positively correlated with energy intake and energy intake from fat in both groups of women and men. It was also reported that there was a positive relationship between the amount of fast food meals and BMI, with a stronger relationship in low-income women (Jeffery & French). Again these results relate to the population of interest examined in our study because they are low-income women.

It has become apparent that overweight is an increasing problem in the American population in not only adults, but also children. Numerous studies have found evidence that mothers influence their children's eating pattern through verbal encouragement and modeling. Most of these studies focus on children over 2 years of age and older. There is a lack in the current literature on assessing the location of meals inside the home, especially for infants and children younger than age of two years. Thus, in our study we will examine how the location of the mother's main meal of the day influences her young infant's eating pattern and weight.

### Methods

The purpose of this study is to investigate the association between the location that a mother eats her main meal of the day and breakfast, her BMI, and her infant's weight at baseline and at 6 months of age. It is hypothesized that mothers who eat their main meal of the day and breakfast at the kitchen or dining room table will have infants of average weight at 6 months of age while mothers who eat their main meal and breakfast elsewhere will have on average heavier infants at 6 months of age. This study will examine the following questions:

1. What is the relationship between the location of maternal meal consumption at baseline and infant's weight gain at 6 months?
2. What is the relationship between the location of maternal meal consumption at 6 months and infant's weight gain at 6 months?

3. What is the relationship between the location of maternal meal consumption at baseline and 6 months and mother's BMI at six months post birth?
4. What is the relationship between the number of family meals eaten together and infant weight gain at 6 months?
5. What is the relationship between the location of maternal meal consumption and family members eating together weekly at birth and six months of infant age?

A secondary analysis of the data from the Making Our Mealtimes Special (MOMS) Study will be performed. The MOMS is an interventional design with repeated measures in a primary care setting. This study has been approved by the Children's Hospital's Internal Review Board (IRB) and the Ohio State University's IRB.

#### MOMS Intervention

Three out of seven "Children's Hospital: Close to Home" clinics were selected to participate. Two of the clinics were selected as the experiment groups, and one clinic was selected as the control group. The clinics were selected based on the high volume of newborns provided care. In all three clinics, medical doctors provided verbal teaching concerning infant health and safety at each well-child visit. Intervention materials added as part of the MOMS intervention were inserted in to previous teaching information. All patients in the three clinics received the anticipatory guidance handouts to take home, even if they were not recruited for the study. Additionally, all of the medical doctor clinic staff were trained to deliver the same information concerning infant health and safety at the beginning of the study, and intermittently retrained to reduce bias.

The first experimental group of mothers, the "Focused Eating" group, were taught and encouraged to maintain healthy eating habits. The MOMS research team, based on the most

recent research literature on maternally focused eating patterns, developed this concept. The second experimental group received the “Ounce of Prevention” program. This program was designed by the Center for Healthy Weight and Nutrition partnership with Borden’s Center for Nutrition. Mothers in this group were provided information about volume and serving sizes for their infants. The third group (control group) received the usual care program “Bright Futures”, developed by the American Academy of Pediatrics. This study only used nutritional guideline excerpts from the American Academy of Pediatrics as a part of patient teaching.

Verbal anticipatory guidance tailored the specific intervention was administered to the mothers every visit along with typical information provided at visits for each group. The health care provider who may be a physician, nurse practitioner, registered nurse, licensed practical nurse or resident documented the delivery of the message. Written handouts were provided, which were available in the most common languages of the area: English, Spanish and Somali. The MOMS project offered several incentives to retain participation of the mothers, such as gift certificates, phone calls, transportation, news bulletins, and thank you cards. To retain mothers throughout the course of the study, rewards such as gift certificates increasing in value at each well child visit were given. Transportation to the clinics was offered to mothers who did not have their own transportation.

### Procedure

All research assistants (RAs) were trained at the beginning of the study by a registered nurse from the MOMS research team. Participants were recruited during a well-child visit when the infant was 2 months of age. Consent was obtained by the RAs before the administration of the questionnaires. A questionnaire was administered to the mother participant at the 2 month, 6 month, 12 month, and 15-18 month well-child visit. Additional information of the infant’s height

and weight was taken from the infant's chart. If the mother participant cancelled the appointment, an RA called the participant to administer the questionnaire via telephone.

### *Research Design*

For this exploratory correlation study, secondary data analysis was conducted using a sample of 306 mother-baby dyads that were participants in the MOMS Study. Three clinics were utilized for data collection with this study. Thirty nine dyads from the Westside clinic, 37 dyads from the Whitehall clinic, and 22 dyads from the primary care clinic participated in the study.

Meal scores were computed by the recoding of variables for both baseline and at six months of infant age. The meal scores were analyzed identically for the baseline and 6 months post birth scores. Two questions were analyzed to compute the mealtime score. The first question, "Where do you usually eat your main meal of the day?" had four possible responses. If the mother responded that she eats her main meal of the day in the kitchen or dining room, she scored one point on this question. The remaining responses: eating in front of the TV, living room or family room, eating in a restaurant, or eating in the car resulted in a score of zero for the question. The next question, "Where do you usually eat breakfast?" also had four possible responses. If the mother replied that she usually eats breakfast in the dining room, she was given a score of one for the question. All other responses: I don't eat breakfast, in front of the TV, living room or family room, or at work were given a score. After these responses were recoded, the scores were added to make the final meal scores, ranging from a score of 0 to 2.

### *Sample*

The current study had an initial sample size of 306 mother and baby dyads with at least 100 dyads per clinic. The three clinics used in the study were selected from the 11 Children's hospital clinics by analyzing the volume of newborns that are seen at each clinic for well child

examinations, and the three clinics with the highest volume were selected for inclusion in the study.

Initially, a significant number of mother and infant dyads were lost due to incomplete or missing data. At the time of the initial questionnaire, the sample size was 160 mother and infant dyads. At the time of the 6 months post-birth questionnaire, the sample size was reduced to 98 mother and infant dyads due to attrition. The following statistics describe the sample size of at 6 months post birth. Over half, 56%, of the sample of babies was African American, 33% was white, 3% was African American and white, 3% was Hispanic and the remaining 5% are included in the other category and include Asian, African or Indian. The mothers' ages ranged from 15 to 42 years of age, with a mean age of 24. A histogram of the mothers' ages is skewed to the right, signifying that our sample is highly concentrated with younger mothers.

A power analysis was performed by the MOMS research team to determine that for a correlational analysis using measures repeated four times, 142 subjects were needed. Based on prior studies conducted at these clinics, it was estimated the study would have a 60% retention rate (French, unpublished). Only biological, English speaking mothers were recruited for the study. Exclusion criteria for the infants included prematurity of less than 36 weeks, hospitalization, a genetic syndrome, gastrointestinal disease or a metabolic disorder.

Women, Infants and Children (WIC) is a program run by each state designed for pregnant and postpartum women, infants and children up to five years of age who are considered to be at nutritional risk and living in low income households. In the 98 mother and infant dyads, 93 of the mothers (95%) were receiving WIC at the time of the initial or both questionnaire.

The sample demonstrates a trend away from the traditional nuclear family, especially in the more poverty stricken areas. The largest group of mothers was single (never married)

mothers, which consisted of almost half (48%) of the population. Additionally, twenty five percent of the participants lived with another relational partner but were not married. Only 24% of the sample was married or engaged, and finally 3% of the sample was divorced or separated.

### Dependent Variables

The dependent variables examined in this study were extracted from the larger MOMS questionnaire specifically, the eating habits questionnaire.

#### *Location of Meals Score*

Ten questions about eating breakfast, eating family meals, skipping meals, dining location and watching television while eating were developed by the research team. These questions are measured nominally, and all together assess the mother's eating habits on a daily and weekly basis. The mother reported in times per day, week, month or never that she ate breakfast, family meals or number of skipped meals. The location of the mother's breakfast was recorded as 'I don't eat breakfast', 'In the dining room', 'In front of the TV in living or family room', 'At work', 'In the bedroom' or 'Other'. The location of the mother's main meal of the day is recorded as 'In the dining room or kitchen', 'In front of the TV in living or family room', 'In a restaurant', 'In the car', 'In the bedroom' or 'Other'. Drinking soda and snacking while watching television are coded in frequency: never (0), once in a while (1), about half the time (2), or most of the time (3). How often the television is turned off during the average week is coded as morning (0), morning and afternoon (1), evening (2), or never (3). For this sample of mothers, the Cronbach alpha was 0.567. The Cronbach alpha value is recognized as a limitation of the study.

### *Infant Height and Weight*

Infant weight and height were interval measurements needed in order to examine research questions #1 and #2. This information was obtained from the charts, which is recorded by a trained nurse or medical assistant. Each clinic measured the infant's weight on a Tanita BWB800 scale and recorded the value to the nearest 0.1 kilogram. All three clinics measured the infant's height with a Seca stadiometer and values were recorded to the nearest 0.5 centimeter. In order to assess growth percentiles, infant weight and height was plotted on growth charts developed by the CDC for infants from birth to 36 months. Infant weight at each survey time, including the birth weight, was recorded from the charts at each clinic. In order to calculate the infant weight gain measure, the infant's birth weight was subtracted from the infant's six month weight, resulting in the infant's weight gain over six months.

### *Maternal Height and Weight*

Research question #3 required the BMI of the mother. This was a self-reported interval measurement. A study performed to assess the validity of self-reported height and weight of reproductive age women found that 84% of women accurately placed themselves into BMI categories solely based on self-reported measurements (Brunner Huber, 2006). The research team used the CDC BMI calculator for adults to compute each mother's BMI from her height and weight.

## **Analysis and Results**

The data from the questionnaires are entered into Microsoft Excel files after each child's visit. The Excel files were exported into SPSS version 15.0 for statistical analysis. Prior to analysis, the database was cleaned and missing cases were evaluated. Cases that had missing data for either the baseline or six month time point were excluded from further analysis.



Descriptive statistics were conducted to describe the sample including frequencies, means, standard deviations and skewness and kurtosis. What about ethnicity, level of education, WIC enrollment, socio-economic variables? Pearson correlations with two sided tailed significance and an alpha level of .05 were conducted to explore the relationships between the variables of interest. ANOVA analysis was completed to determine group differences using an alpha level of .05.

### *Results*

**1. What is the relationship between the location of maternal meal consumption at time of infant's birth and infant's weight gain by 6 months?**

- a. No significant correlation was found between the location of maternal meal consumption time of infant's birth and infant's weight gain by 6 months ( $r = .026$  and  $p = .743$ ).

**2. What is the relationship between the location of maternal meal consumption at 6 months after infant's birth and infant's weight gain by 6 months?**

- a. The relationship between the location of maternal meal consumption at 6 months after the infant's birth (6 month meal score) and the infant's weight gain by 6 months was not significant ( $f = .115$ ,  $p = .89$ ,  $df = 2$ ).

**3. What is the relationship between the location of maternal meal consumption at baseline and at 6 months of age and mother's BMI at 6 months post birth?**

- a. The relationship between the mother's BMI at 6 months post birth and the location of maternal meal consumption at baseline was also insignificant

( $r = -.045$  and  $p = .657$ ). The relationship between the mother's BMI at 6 months post birth and the mother's meal score at 6 months post birth was not significant ( $r = -.055$  and  $p = .590$ ).

**4. What is the relationship between family members eating together at 6 months and infant weight gain by 6 months of age?**

- a. When families are eating together on a weekly basis at infant's six months of age, no significant correlation with the weight gain of the infant up to six months was found ( $r = .243$  and  $p = .365$ ). However, a weak positive correlation was found between the occurrence of skipping meals in the past 12 months and the mother's BMI at birth ( $r = .178$  and  $p = .033$ ).

**5. What is the relationship between the location of maternal meal consumption and family members eating together weekly at birth and six months of infant age?**

- a. A strong negative correlation was found between the location of maternal meals at baseline and families eating together on a weekly basis ( $r = -.644$  and  $p = .007$ ). On the opposite side of the spectrum, a strong positive correlation was found between the location of maternal meal consumption at six months post birth and families eating together on a weekly basis ( $r = .670$  and  $p = .005$ ).

### Discussion

Since there was no relationship between the location of maternal meal consumption at the time of the infant's birth or at 6 months after the infant's birth and infant weight gain in this sample, patient teaching concerning this meal location may not be necessary in the early months of an infant's life. However, nurse researchers should continue to explore possible causes of extreme weight gain in infants and children in connection with the mother, such as the content of

meals, perhaps how fast the mother eats her meals, and frequency of exercise. Perhaps, content of meals and meal location is not related to infant and child weight gain until more solid foods are introduced into their diets.

The results of this study indicate that the location of meals may not be related to the weight of the mother, and as other studies have shown may not be related to the weight gain of the infant at least during the first six months of life. Therefore, further research should examine variables related to maternal weight gain, such as kind of food eaten, exercise, and possibly the role of genetics. It is known that genetics is a risk for obesity, but when does the child begin to exhibit these signs, and what triggers the onset of overweight?

Since mothers with higher BMIs were found to be more likely to skip meals, the effect of poor eating habits on the mother's BMI and weight status is supported. This result shows the connection of poor eating habits such as eating in various locations and inconsistent meals, and its relationship on the mother's health; however, in our sample, the infants were not similarly related to the variables. Since this study was only carried out until 6 months of age, it is possible that the relationship between maternal eating habits and infant weight gain did not surface within this time span. Perhaps, the role modeling of maternal eating habits on offspring is not evident until the offspring consumes similar foods. Furthermore, socialization of eating habits occurs over time and the six month time span used in this study may not be sufficient. Longitudinal studies are needed that study maternal and infant eating habits over time, especially the first few years of life.

A significant negative correlation was found between the location of maternal meals at birth and families eating together on a weekly basis at six months. In other words, mothers who had a higher meal time score at birth were less likely to eat with their families at six months.

However, at six months post birth, the mothers who earned a higher mealtime score were more likely to eat together with their families on a weekly basis. This finding may indicate how a new baby impacts a family and its habits. Bringing home a new baby disrupts the family dynamics by dictating an irregular routine of at least the mother, which may impact the ability of a family to eat together. It is suggested that at six months post birth the family has reorganized, and that the baby is now on schedule with the family.

Poor maternal eating habits had a direct impact on maternal BMI but no evidence in our sample suggested a correlation with infant weight gain. Therefore, the nurse should focus their patient teaching on how to structure a complete healthy diet for the mother and her infant. Additionally, the nurse may advise mothers to exercise appropriately, and inform them of the direct impact her habits have on her children as shown by previous research.

This sample extracted from the MOMS study did not demonstrate a relationship between the location of meals and infant weight gain. However, the elements that were available in the questionnaire to determine the mothers' meal scores were limited, only allowing a limited picture of the mothers' mealtime habits. The study experienced a higher than expected attrition. Therefore, the study may be underpowered based on the power analysis that showed that at least 142 dyads were needed to attain .80 power at  $p = .05$ . At six months only 98 dyads were retained with complete data. Consequently, there is an increased chance of type II error, not allowing our study to uncover a possible significant relationship.

Future studies should place more emphasis on participant retention in this population. About two thirds of the sample size was lost in between the initial recruitment at birth and the second questionnaire six months later. About half of the data was eligible for our analysis of the preliminary questionnaire, which was reduced further at the six-month survey. Important

populations of the study may be underrepresented in the survey results because of this significant loss in participation. For instance, low-income mothers tend to be more transient, changing addresses and phone numbers frequently making long-term data collection more difficult and skewing subsequent survey pools towards middle and upper-income demographics. The length of the survey, taking about 15-20 minutes to complete, may have been cumbersome to new mothers. Other mothers may have been embarrassed about by their mealtime or parental habits. Perhaps a shorter survey and an increased participation reward would encourage consistent participation.

In our study, location was the only determinant of the maternal meal score. In future studies, content of the meals should be considered as well as the location. For example, a mother who drinks a cup of coffee at the dining room table would earn a higher meal score than a mother who eats a bowl of oatmeal in any other place besides the kitchen or dining room. As one would assume, the bowl of oatmeal is more nutritious than the cup of coffee, and this is not reflected in our study. However, in the case of some low-income families, the kitchen may not allow room for table, just as a studio apartment does not.

Maternal influence was the sole focus of this study, however, other family members living with the infant involved have an impact on his or her habits. In some cultures, specifically African American, grandparents often cohabit with and have a role in raising their grandchildren. Older siblings often have an influence on younger siblings as younger siblings often mimic their older brothers and sisters. Paternal influence should also not be overlooked, as married and cohabiting parents usually have a shared role in caring for the infant. Future studies should include all family members living with the child or involved in nurturing the child. In order to fully analyze this phenomenon, the study should be extended into toddler hood.

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